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Ship Conveyor System

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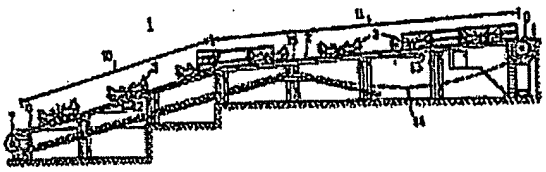
[Abstract]

The invention concerns a continuously operating ship conveyor system (1), especially for whitewater systems, with an endless conveyor belt (2) for transport of ships (3) from a first water surface (4) to a second water surface (5) situated above the first. In order to increase the capacity of the system, consisting of waterways, ships (3), ship conveyor system (1), as well as entry and exit station (16), it is proposed according to the invention that the entry and exit station (16) required in such systems be part of the ship conveyor system (1). For this purpose, the conveyor system (1) has a first relatively steep conveyor path (10) to overcome a correspondingly large height difference, as well as a second, flat conveyor path (11), and the conveyor belt (2) is relatively wide. In the region of the flat conveyor path, a convenient and non-hazardous entry to

and exit from the conveyor belt (2) into ships (3) and vice versa can occur, and simple transfer from conveyor belt (2) to land and vice versa.



The invention concerns a continuously operating ship conveyor system with an endless conveyor belt for transport of ships from a first water surface to a second water surface situated above the first, according to the features of the preamble of Claim 1. The invention also refers to use of such conveyor systems to transport sightseeing boats in whitewater systems of recreation parks.

Ships conveyor systems of the generic type are conventionally known. They are mostly used in recreation parks. The ships, occupied usually by 5 to 10 persons, travel from a point located higher in the terrain in a water canal with gradient zones downward and then reach the vicinity of their exit point, to a ship conveyor system, with which they are conveyed back to the exit position.

In a known ship conveyor system (not of the generic type), the passengers usually disembark from the ship before the ship is loaded onto the receiving site of the conveyor belt and transported upward (exit station). After the ship has passed the release point of the conveyor belt and is in the water again, the new passengers embark on the corresponding ship (entry station).

A drawback in these known ship conveyor systems is mostly that the ships must be stopped for safety reasons at the entry and exit station and, because of this, continuous operation of the system is not possible. The capacity of such whitewater systems is therefore relatively limited.

Whitewater systems are also known in which the passengers, during transport of the ships on the ship conveyor system, remain in them and only disembark when the ships have passed the release point of the conveyor belt and are again in the water, i.e., a single entry and exit station following the ship conveyor system is used. The passengers, however, must then get on and get off on the same side of a platform rotating at the speed of the ships.

A shortcoming in this system is that the embarking and disembarking passengers are often hampered and therefore only a very slow operation of the entire system is possible. In addition, it can always be possible for persons (mostly children and the elderly) to fall inadvertently into the water.

The underlying problem of the invention is therefore to provide a ship conveyor system of the type mentioned above, with which the capacity of the entire system, consisting of waterways, ships, a ship conveyor system, as well as an entry and exit station, can be increased relative to known systems and safe entry and exit of the passengers is also guaranteed.

This problem is solved according to the invention by the features of the characterizing part of Claim 1. Additional particularly advantageous embodiments of the invention are disclosed in the dependent claims.

Claim 7 refers to an advantageous use of such ship conveyor systems to transport sightseeing boats in whitewater systems of recreation parks.

The invention is based essentially on the idea that

- differently than in known ship conveyor systems,

- the entry and/or exit stations are not arranged before or after the ship conveyor system, but are part of the ship conveyor system itself. The ship conveyor system therefore consists of a first section, in which the ships overcome a relatively large height difference, and a second section with a relatively flat conveyor path. Within this second section, the passengers can embark or disembark during ship transport and from several sides. For this purpose, the conveyor belt is constructed correspondingly wide. Simple transfer to the ground and vice versa is also possible from the conveyor belt.

Additional details and advantages of the invention are apparent from the following practical examples, explained by means of figures. In the figures:

Figure 1 shows a side view of the ship conveyor system according to the invention with an endless conveyor belt;

Figure 2 shows a top view of the system depicted in Figure 1;

Figure 3 shows a single sheet of the conveyor belt;

Figures 4 and 5 show the delivery site of the conveyor belt with the ship separation and position station in a side view and top view, and

Figures 6 and 7 show the delivery site of the conveyor belt with the subsequent water canal, in a side view and top view.

In Figure 1, a continuously operating ship conveyor system is labeled 1, with an endless conveyor belt 2 to transport ships 3 from a first water surface 4 (Figure 4) to a second water surface 5 (Figure 6), situated above the first. The endless conveyor belt 2 is guided around its entry site 6 around a deflection drum 7 and in the region of its exit site 8, around a drive drum 9 by a drive motor (not shown for reasons of better clarity).

The conveyor belt 2 situated between the entry site 6 and delivery site 8 passes through a first relatively steep conveyor path 10, as well as a second relatively flat conveyor path 11. Experiments have shown that the slope angle 12 of the steep conveyor path 10 should lie

between 13° and 18°, preferably at about 15°. On the other hand, for the slope angle 13 of the flat conveyor path 11, the slope angle should lie between 0° and 6°, preferably about 4°.

It has also proven advantageous to allow the lower conveyor belt surface, denoted 14, to hang, because tension of the upper conveyor belt surface 15 is automatically produced thereby and a tension station for the conveyor belt 2 can be omitted.

The conveyor belt 2 according to the invention, in the region of the second relatively flat conveyor path 11, mostly forms, with its edge zones, but also with its other free surface, the essential part of an entry and exit station, labeled 16 in Figure 2. In addition to the conveyor belt 2 (as mobile part), the entry and exit station 16 also has entrances 17, 18, as well as exits 19 and emergency exits 20 and 21 (as non-moving parts). Advantageously, the entrances and exits 17, 18 and 19 are arranged (offset), so that entry into the ships 3 can or must occur from one side and exit from the ships 3 from the other side.

It has also proven advantageous if the entrances are arranged so that the passengers do not walk across, but in the movement direction on the conveyor belt 2.

The width 22 and length of conveyor belt 2, in the region of the entrance and exit station 16 depends both on the number of ships 3 that are to be simultaneously filled with passengers or disembarked by passengers and on to the dimensions of the ships 3. In a preferred embodiment, the width 22 of conveyor belt 2 can be about 5.2 m and its length, in the region of the entrance and exit station 16, about 20 m. Sightseeing boats having a modular design with corresponding seats 5 can be used as ships 3 that have a diameter of about 3 m. The conveyance speed of ships 3 on the conveyor belt 2 can be adjusted continuously in this system between 0.18 and 0.55 m/s.

The conveyor belt 2 consists of at least two conveyor chains arranged parallel to each other, on which narrow plates, for example, made of aluminum, are fastened across the longitudinal direction of the chains. In the practical example depicted in Figure 2, a total of four conveyor chains 24-27 are used, on which the plates denoted 28 are situated.

The cross section of a particularly suitable metal plate 28, for practical conditions, is shown in Figure 3. It consists essentially of a support plate 29 and two reinforcement profiles 30, 31, the latter being screwed to the chains 24-27. For this purpose, slits 34, 35, into which head screws (not shown here) are mostly inserted from the open sides, are situated on the bottom of reinforcement profiles 30, 31 provided with cavities 32, 33. Because of this configuration of the reinforcement profiles 30, 31, the screws can be joined much more quickly with the plates 28 than if holes were provided in the reinforcement profiles 30, 31.

In order to guarantee reliable transport of ships 3 and to avoid slipping of the passengers walking on conveyor belt 2, the support plate 29 is provided on its top 36 with fluting 37 and with grooves 38. Parts 39 made of an elastomer that protrude over the top of plate 28 are inserted in grooves 38.

The ends 40, 41 of plates 28 are constructed, so that the adjacent plates overlap. To depict this, the end of the plate 28' closest in the movement direction 42 of the conveyor belt is drawn in Figure 3 with a dashed line.

A ship separation and positioning station 43 arranged in the region of the entry site 6 of the conveyor belt 2 is depicted schematically in Figures 4 and 5. The ships 3 situated in the (first) water surface 4 pass through an entry chamber 44 with lateral guidance to a roll guide 44, which transports the ships 3 to the receiving site 6 of the endless conveyor belt 2.

In order to guarantee, on the one hand, continuous operation of the ship conveyor system 1 and, on the other hand, convenient entry and exit of passengers, it is essential that the ships 3 have a stipulated minimum distance from one another on conveyor belt 2. This is achieved by the fact that transport of ships 3 over the roll guide 45 always occurs when the last ship leaving the ship separation and positioning station 43 has covered a specified zone with the endless conveyor belt 2.

Figures 6 and 7 again schematically show the delivery site 8 of the conveyor belt 2, to which a sliding grate 46 is connected, via which the ships 3 are introduced again into the upper (second) water surface 5.

The ship conveyor system according to the invention is particularly suited for transport of known sightseeing boats, as are often used in whitewater systems in recreation parks. These boats have a flat bottom with a knob-like bottom made of elastomer, so that the ships are secured on the plates of the conveyor belt. Additional fastening by means of belts, etc., is therefore unnecessary.

List of reference numbers

1	Ship conveyor system
2	Endless conveyor belt
3	Ship
4	First water surface
5	Second water surface
6	Receiving site
7	Deflection drop
8	Delivery site
9	Drive drum
10	Steep conveyor path
11	Flat conveyor path
12	Slope angle of the steep conveyor path
13	Slope angle of the flat conveyor path

14 Lower conveyor belt surface
15 Upper conveyor belt surface
16 Entry and exit station
17, 18 Entrances
19 Exit
20, 21 Emergency exits
22 Width of the conveyor belt
23 Diameter of the ships
24-27 Conveyor chains
28, 28' Metal plates
29 Support plate
30, 31 Reinforcement profiles
32, 33 Cavities
34, 35 Slits
36 Top
37 Fluting
38 Groove
39 Part made of an elastomer
40, 41 Plate ends
42 Movement direction of the conveyor belt
43 Ship separation and positioning station
44 Entry chamber
45 Roll guide
46 Sliding grate

Claims

1. Continuously operating ship conveyor system (1) with an endless conveyor belt (2) for transport of ships (3) from a first water surface (4) to a second water surface (5) situated above the first, in which, in the region of conveyor system (1), an entry and exit station (16) for the ship passengers is provided, characterized by the features:

a) the conveyor system (1) has a first, relatively steep conveyor path (10) to overcome a correspondingly large height difference, as well as a second flat conveyor path (11), at which the entry and exit station (16) is arranged;

b) the width (22) of conveyor belt (2) is chosen relative to width (23) of ships (3), so that the entry into and exit of passengers from ships (3) can occur over a part (edge zone) of conveyor belt (2).

2. Continuously operating ship conveyor system according to Claim 1, characterized by the fact that slope angle (12) of the steep conveyor path (10) lies between 13° and 18° and the slope angle (13) of flat conveyor path (11) lies between 0° and 6°.

3. Continuously operating ship conveyor system according to Claim 1 or 2, characterized by the fact that the endless conveyor belt (2) consists of at least two conveyor chains (24-27) arranged parallel to one another, on which relatively narrow metal plates (28, 28'), overlapping in the longitudinal direction of the conveyor chains (24-27), are fastened across the longitudinal direction of conveyor chains (24-27).

4. Continuously operating ship conveyor system according to Claim 3, characterized by the fact that the metal plates (28, 28') have flutings (37) on the top (36), as well as grooves (38), for introduction of a part (39) made of elastomer protruding above the top (36) of plates (28, 28').

5. Continuously operating ship conveyor system according to one of Claims 1-4, characterized by the fact that the length of the endless conveyor belt (2) is chosen such that the lower conveyor belt surface (14) is suspended and therefore causes automatic tightening of the upper conveyor belt surface (15).

6. Continuously operating ship conveyor system according to one of the Claims 1-5, characterized by the fact that for supply of ships (3) to the receiving site (6) of conveyor system (1), a ship separation and positioning station (43) is provided, which consists essentially of an entry chamber (44) and a roll guide (45), in which transport of ships (3) always is done via roll guide (45) when the ship (3) last leaving the ship separation and positioning station (43) has covered a specified path with the endless conveyor path (2).

7. Use of a continuously operating ship conveyor system according to one or more of the Claims 1-6 to transport sightseeing boats (3) in whitewater systems of recreation parks.

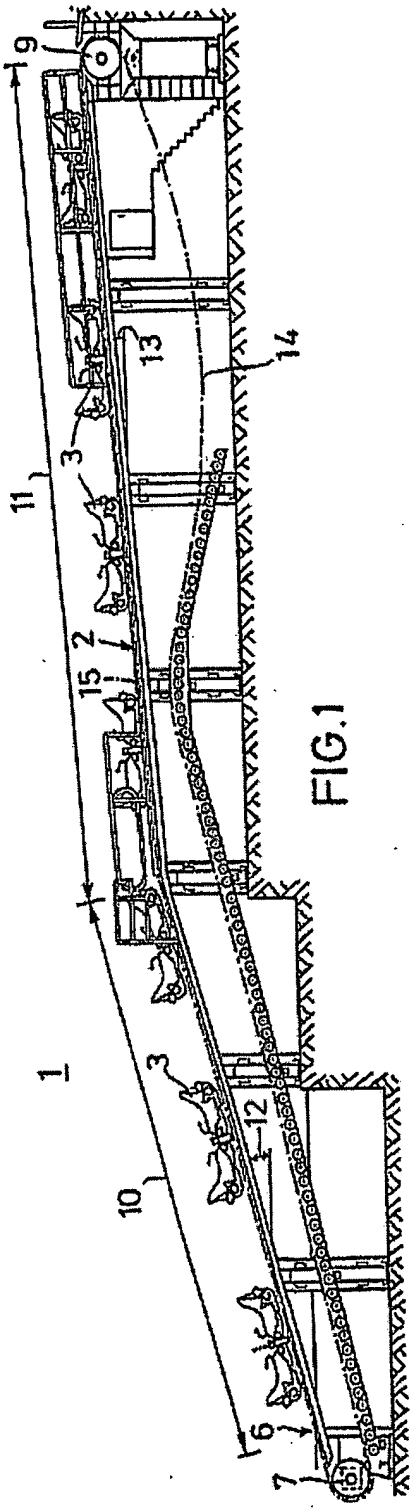


FIG.1

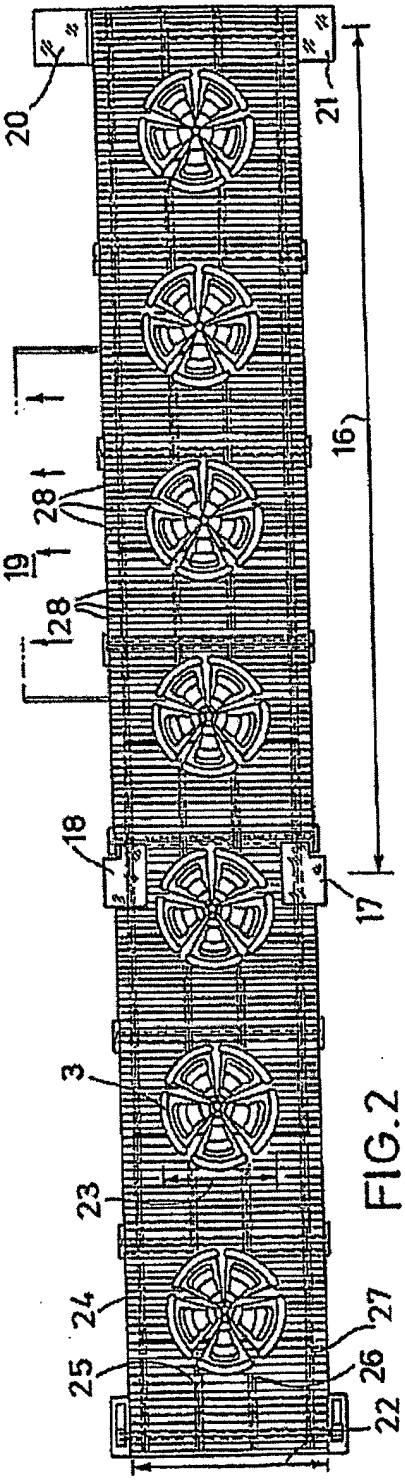


FIG.2

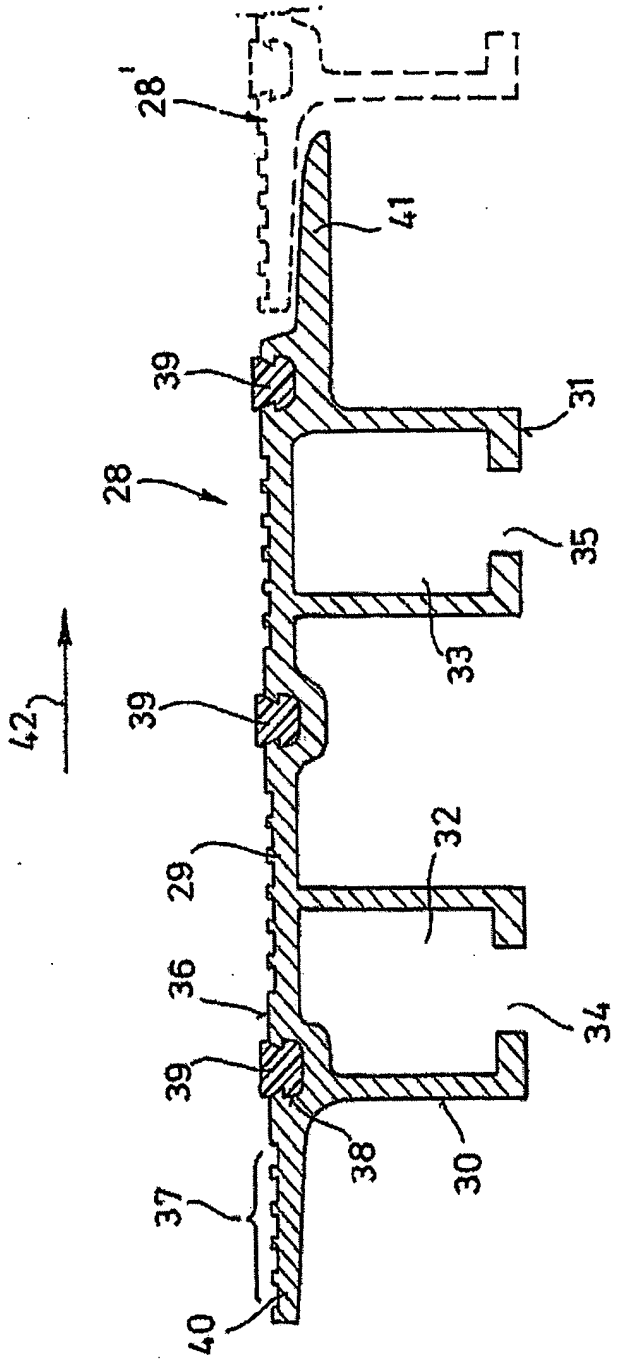
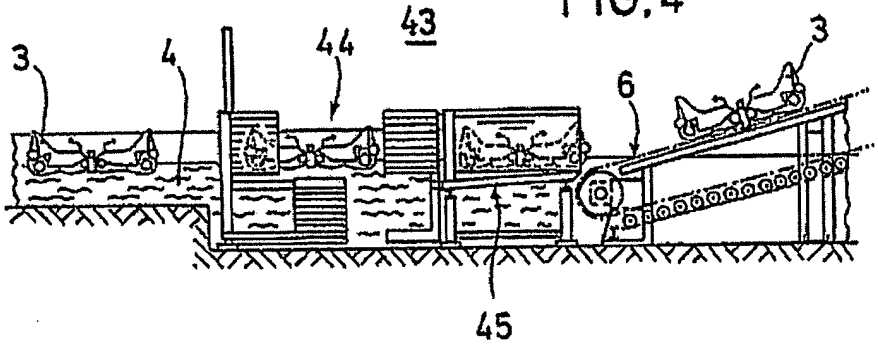


FIG. 3

FIG.4



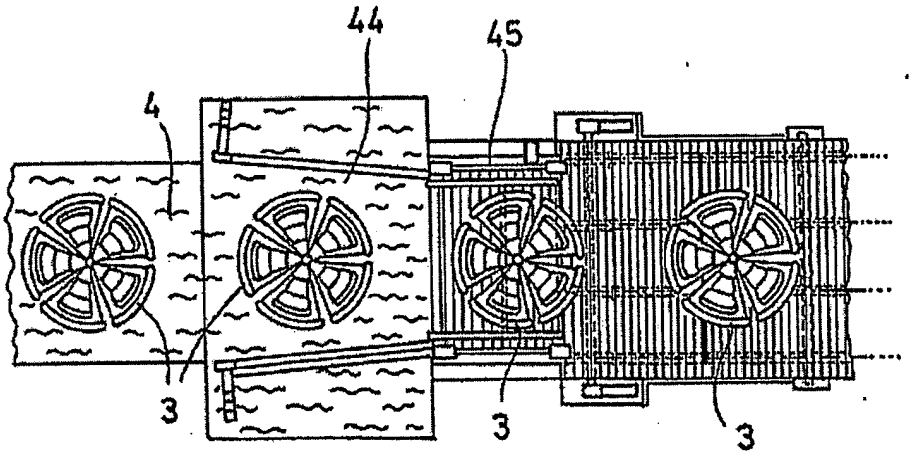
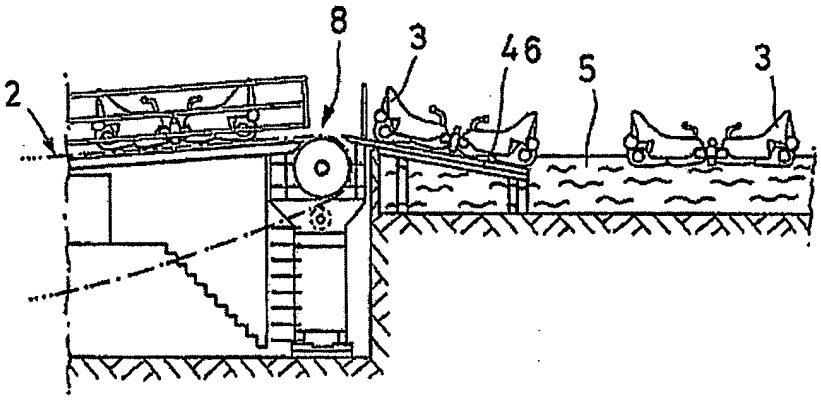


FIG.5

FIG.6



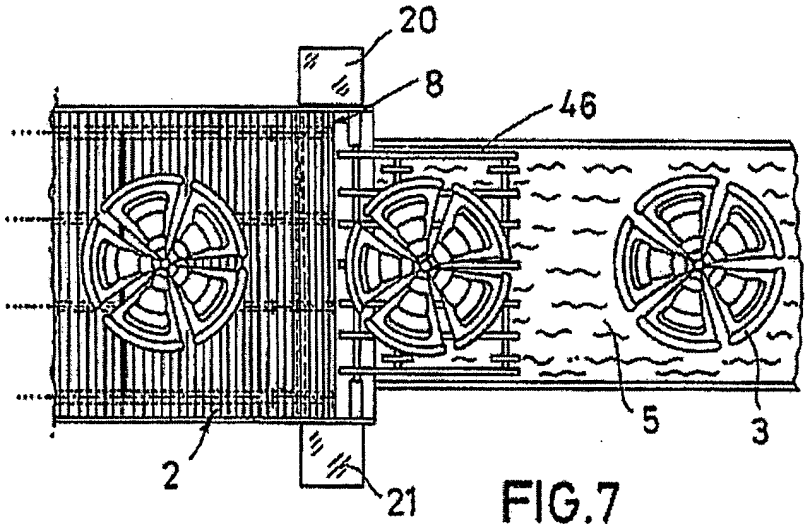


FIG.7